treating said blended furnish with a hydrolytic enzyme capable of hydrolyzing at least a portion of the fibers of said blended furnish to form aldehyde groups predominantly on the surface of said portion of fibers, wherein the dosage of said hydrolytic enzyme is from about 0.1 to about 10 s.e.u. per gram of oven-dried pulp; and

forming the paper web from the blended furnishes.

~~93~~. A method as defined in claim 92, further comprising the step of applying an additive to said first fibrous furnish, said second fibrous furnish, said blended furnishes, or combinations thereof, said additive being selected from the group consisting of a cross-linking agent, a strength agent, a debonder, and combinations thereof.

~~94~~. A method as defined in claim 92, wherein said hydrolytic enzyme comprises cellulosic-binding-domain free endo-glucanase.

REMARKS

Favorable reconsideration and allowance of the present application is respectfully requested.

Claims 56-94, including independent claims 56, 77, and 92, are currently pending in the present application. Independent claim 56, for instance, is directed to a method for forming a paper product that includes at least one paper web that contains at least one layer formed primarily from hardwood fibers. The method comprises treating the hardwood fibers with a first hydrolytic enzyme to hydrolyze the hardwood fibers and form aldehyde groups predominantly on the surface of the hardwood fibers. The dosage of the first hydrolytic enzyme is from about 0.1 to about 10 s.e.u. per gram of oven-dried pulp. The enzyme-treated hardwood fibers can provide additional strength to the paper web such that lint and slough can be minimized, while the hardwood fibers

can help to provide a product that is soft. An additive selected from the group consisting of a cross-linking agent, a strength agent, a debonder, and combinations thereof, may also be incorporated into the paper web.

In the Office Action, original claims 1-17 were rejected under 35 U.S.C. §102(e) as being anticipated by or, in the alternative, under 35 U.S.C. §103(a), as being obvious over U.S. Patent No. 6,319,361 to Smith, et al. Specifically, in the Office Action, it was stated that original claims 1-17 were "product-by-process" claims and that, irrespective of the method by which the aldehyde groups are introduced into the cellulose or wood pulp, the final product is a paper containing cellulose fibers having free aldehyde groups. Likewise, claims 18-36 were similarly rejected under 35 U.S.C. §103(a) over Smith, et al. in view of U.S. Patent No. 5,405,501 to Phan, et al. Without commenting on the propriety of these rejections, Applicants simply note that the present claims 56-94 are method claims that positively recite the step of treating cellulosic fibers with a hydrolytic enzyme, which is nowhere disclosed or suggested in the above-cited references. Thus, for at least this reason, Applicants respectfully submit that the present claims patentably define over Smith, et al. and/or Phan, et al., taken singularly or in any proper combination.

In addition, original claims 1-17 were also rejected under 35 U.S.C. §102(b) as being anticipated by, or in the alternative, under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,620,565 to Lazorisak, et al. Lazorisak, et al. is directed to a method for producing soft tissue products by treating the fiber prior to sheet formation. The tissue products are produced by mixing enzyme-treated, high yield cellulosic fibers with an oil. (Col 5, lines 39-59). Virgin, coarse, high yield fibers (e.g., stone

groundwood, thermomechanical and chemithermomechanical pulps) can be made suitable for producing soft tissue type products by the addition of oils typically found in newspaper inks and subjecting the oil-treated virgin to enzyme treatment. (Col 4, lines 25-30). The enzyme treatment is utilized to loosen a limited amount of the ink constituents for removal and/or redistribution on the fibers. (Col 3, lines 65-67 and Col 4, line 1).

However, the mechanism through which Lazorisak, et al. achieves softness is completely different than the mechanism used to achieve the desired balance of softness and strength in the present claims. Independent claim 56, for instance, requires that the paper web contain at least one layer formed primarily of hardwood fibers. By containing hardwood fibers, the layer is relatively soft in comparison to layers formed with certain other types of fibers. However, soft fibers also tend to result in a layer that is weaker and has higher levels of lint and slough. To counteract this tendency, Applicants have discovered that a specific dosage of a hydrolytic enzyme can increase the strength of the hardwood fiber layer to an extent such that lint and slough are reduced without substantially sacrificing softness.

The hydrolytic enzyme hydrolyzes the hardwood fibers and forms aldehyde groups predominantly on the surface of the hardwood fibers. These aldehyde groups become sites for cross-linking with exposed hydroxyl groups of other fibers when the fibers are formed and dried into sheets, thus increasing sheet strength. In addition, by randomly cutting or hydrolyzing the fiber cellulose predominantly at or near the surface of the fiber, degradation of the interior of the fiber cell wall is avoided or minimized. Consequently, a paper web made from these fibers alone, or made from blends of these

fibers with untreated pulp fibers, show an increase in strength properties such as dry tensile, wet tensile, tear, etc. (Appl. pg. 8).

In addition, an additive (e.g., debonder, cross-linking agent, and/or strength agent) may be used in the present claims to further maintain the desired balance of softness and strength.

Nowhere does Lazorisak, et al. disclose this specific combination of features to achieve the desired balance between strength and softness. For instance, Lazorisak, et al. fails to disclose the specific paper web construction set forth in the present claims. Further, there is no indication in Lazorisak, et al. that the enzyme described therein enhances the strength in the manner set forth in the present claims. Instead, Lazorisak, et al. describes applying an oil to fibers and treating the fibers with an enzyme. The enzyme is said to redistribute the oil along the surface. Thus, when viewing the teachings of Lazorisak, et al. in its entirety, one of ordinary skill in the art would simply not have been motivated to modify the teachings of Lazorisak, et al. in the numerous ways required to achieve the limitations of the present claims.

In the Office Action, Phan, et al. was also cited in combination with Lazorisak, et al. in an attempt to render obvious original claims 18-37 and 40-41. Specifically, it was stated that Phan, et al. shows that it is conventional to prepare multilayered tissue paper where hardwood pulp, softening agents, and strength agents are located in the outer layer to achieve the requisite softness and strength. However, Applicants initially note that Phan, et al. completely fails to recognize the use of a specific dosage of a hydrolytic enzyme as set forth in the present claims.

Moreover, Applicants respectfully submit that one of ordinary skill in the art would not have found it obvious to combine Lazorisak, et al. and Phan, et al. in the manner suggested in the Office Action. For example, to control lint resistance, Phan, et al. utilizes a specific percentage of a quaternary ammonium/polyhydroxy softening composition and a binder (e.g., wet and dry strength resins). (Cols 3-4). However, the specific combination of components is critical to the balance between softness and strength desired in Phan, et al. As an example of the critical balance, Phan, et al. states the following:

> The present invention contains as an essential component a mixture of a quaternary ammonium compound and a polyhydroxy compound. (Emphasis added) (Col 5, lines 54-56).

Likewise, Lazorisak, et al. also emphasizes the criticality of the oil and enzyme treatments described therein. For example, Lazorisak, et al. states the following:

> It is critical in the practice of the present invention that a sufficient quantity of oils typically found in used newspapers be on or in the fibers prior to making tissue or other types of sanitary products (e.g., towels, napkins, and facial tissues) from such fibers. (Emphasis added) (Col 5, lines 64-67 and Col 6, lines 1-2).

Based on the completely different mechanisms used to achieve softness of the paper product in Lazorisak, et al. and Phan, et al., and the specific criticality placed on such mechanisms by each reference, Applicants respectfully submits that one of ordinary skill in the art would not have found it obvious to combine the references in the manner suggested in the Office Action. Thus, for at least the reason set forth above, Applicants respectfully submit that the present claims patentably define over the above-cited references, taken singularly or in any proper combination.

In addition, Applicants also note that the specification has been amended as referenced above. It is submitted that such amendment does not constitute new matter. (See e.g., Examples 1-3, Appl. pgs. 24-36).

In summary, Applicants respectfully submit that the present claims satisfy all the requirements of 35 U.S.C. §112 and patentably define over the prior art of record for at least the reasons set forth above. As such, it is believed that the present application is in complete condition for allowance and favorable action, therefore, is respectfully requested. Examiner Chin is invited and encouraged to telephone the undersigned, however, should any issues remain after consideration of this response.

Please charge any additional fees required by this Amendment to Deposit Account No. 04-1403.

Respectfully submitted,

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APPENDIX A

Marked up version of the paragraph beginning on page 5, line 10:

In general, the present invention is directed to a paper product that is strong, soft, and produces low amounts of lint and slough. In particular, the paper product includes hardwood fibers (e.g., eucalyptus fibers) treated with a hydrolytic enzyme and other fibers, such as softwood fibers (e.g., northern softwood kraft fibers), recycled fibers, etc., that may or may not also be treated with a hydrolytic enzyme. In one embodiment, the paper product includes a paper web having at least one layer formed primarily from hardwood fibers. The enzyme-treated hardwood fibers can provide additional strength to the paper web such that lint and slough can be minimized, while the hardwood fibers can help to provide a product that is soft. In addition, other ingredients, such as cross-linking agents, debonders, strength-agents, and the like, can also be selectively utilized to form paper webs having certain attributes.